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ABSTRACT

This study presents the case of a preservice science student teacher who wanted to make the science classroom an equitable place of learning. The paper focuses on her cross-cultural student teaching experience in an urban middle school. Data were gathered from in-depth interviews conducted throughout her student teaching experience, a journal in which she recorded her daily experiences and reflections, and classroom observations. According to the results, the teacher experienced an unfamiliarity with her students and their life experiences. She experienced a marginalization of her students in science, both by themselves and by her colleagues. She also experienced a desire for her science instruction to become more relevant to her students. Her beliefs guided her in providing more equitable instruction to her students and prevented her from compromising her own instruction. While she adhered to the school's instructional requirements, she did not accept marginal science experiences for her students. In the face of opposition from colleagues or students, she reinforced her beliefs with positive interactions with her students and peers. She gathered the support she needed to create the instructional climate she wanted. (Contains 19 references.) (Author/SM)

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Learning to Teach in a Diverse Setting: A Case Study of a Multicultural Science Education Enthusiast

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Learning to Teach in a Diverse Setting: A Case Study of a Multicultural Science Education Enthusiast

At the conclusion of Secondary Science Methods, Jill[1] presented her research based rationale that depicted her teaching philosophy of secondary science. Of Jill's five goals for students, one goal stated simplistically the importance of equity in her classroom -- "Students will learn in an equitable environment (p.1)". For Jill, creating an equitable science environment meant empowering and valuing each student in her class, and providing each student with rich and meaningful opportunities to "do" and learn about science. She wanted her student-centered classroom to encourage each student to structure and restructure their personal and world views about science, while she consciously worked to remove the inherent cultural biases that can limit students in their learning of science. Jill represents a new generation of preservice science teachers, preservice teachers who are concerned that current science instruction is not equitable to culturally diverse students[2].

This study presents the case of Jill, a preservice science student teacher whose desire to create a science classroom as an equitable place of learning earned her the recognition as a multicultural science education enthusiast. This case specifically examines her cross-cultural student teaching experience. In-depth interviews, a journal, and classroom observations were used to capture Jill's student teaching experience. This case study contributes to the field of study that focuses on science student teachers who are learning to teach in a cultural setting that is different than their own.

Relevant Literature

Studies of preservice teachers who have participated in multicultural education programs demonstrate the complexity of developing a multicultural practice. Paine (1990) suggested that a student could hold one of four orientations about diversity: an individual orientation - in which differences among students are attributed to their individual characteristics; a categorical orientation - in which differences among students are recognized as a result of their membership within a cultural group; a contextual orientation - in which differences among students are a result of society and socially constructed; or a pedagogical orientation - in which students are recognized as contextually different and implications are made for learning and teaching. Ross and Smith (1992) found that preservice teachers' orientations were more complex than Paine (1990) had suggested, and they found that preservice teachers' beliefs about diversity were influenced by several factors (e.g. experience with different cultures, teaching experiences, etc.). Atwater (1996), and Ross and Smith (1992) concluded that the orientations of preservice students could create positive climates for diverse students, but there was still the potential for unintentional discrimination in the classroom. Grant and Tate (1995) found that preservice student teaching experiences that are within a multicultural community can contribute positively to a preservice teacher's ability to work in diverse settings.

Research Context

Jill

Jill was originally from the east coast and moved to the southwest to pursue a degree in anthropology. She shifted the emphasis of her degree from anthropology to biology in the middle of her undergraduate program. Prior to completing her degree in

biology, she applied to the initial teacher certification program in the College of Education. Throughout her teacher certification program, Jill constantly refined her ideology about working with diverse populations. During Science Methods (her final year of course work) she became known as a multicultural science education enthusiast; a preservice teacher who is excited to make science accessible and relevant to all students. Jill completed her student teaching following Science Methods, at Center City Middle School, a predominately Hispanic-American school.

Researcher

Prior to this study, I was Jill's Secondary Science Methods instructor. I was interested in multicultural science education, but I was not the informed enthusiast that Jill was. Following Secondary Science Methods, I was assigned to supervise Jill' student teaching experience. Her interest in multicultural education and my interest in making science education more culturally accessible, led me to propose this study to her. Jill was willing and excited to participate.

Methods

The data sources for this project were: a) in-depth interviews that were conducted with Jill throughout her student teaching experience at Center City Middle School, b) participant observations and discussions about the observation of Jill's science teaching, and c) a journal in which Jill recorded her daily teaching experiences and her reflections about her teaching. Data were collected throughout Jill's student teaching to reveal her journey as a multicultural science education enthusiast. While multiple data sources in this study provided a rich pool of information about Jill's experiences, they also achieved triangulation (Marshall & Rossman, 1989; Mathison, 1988).

The principles of constructivist analysis guided the interpretation of the collected data (Denzin, 1994; Guba & Lincoln, 1989). A interim analysis began as the data were first being gathered. The initial constructions were tentative and emerged through the periodic interactions between Jill and I. These constructions helped to define how clearly the research topic was being captured, and indicated if necessary adjustments needed to be made within the design protocol (Huberman & Miles, 1994). During the summer, the transcripts from Jill's interviews, Jill's journal, and transcribed participant observations were inductively analyzed (Bogdan & Biklen, 1992; Huberman & Miles, 1994) by two researchers. Although Jill's summer responsibilities prevented her from continually participating in the analysis, she was frequently contacted to evaluate, discuss, clarify, and verify the emergent themes. The iterative process utilized the constant comparative method (Glasser & Strauss, 1967; Bogdan & Biklen, 1992) to compare and apply incidents to categories, to integrate categories and their properties, and to delimit and write the theory (Denzin, 1994, p. 508). Two ensuing reviews assessed the quality and authenticity of the produced themes.

Findings

Jill experienced an unfamiliarity with her students and their life experiences

Throughout Jill's student teaching experience she continually stated that she "did not know her students." This simple statement varied little in its form, yet its meaning varied significantly throughout the semester. Early in her student teaching experience, Jill attributed "not knowing her students" to not knowing the group of students as a whole. Later in her student teaching experience, Jill felt that "not knowing her students" meant not knowing individual students.

Early in her student teaching, her not knowing the students revolved around her inability to understand why her students behaved as they did. Jill was frustrated that several of her students would not participate in class or come to class, and that they would often elect to disrupt class as opposed to participate. It was not uncommon for Jill to openly ponder why her students behaved as they did, for example:

> I guess I have no...I have no way to understand why these kids are doing this. I can only theorize about their home life or their motivation, but I have no claim of understanding how they can be this way (Interview 1a, 379-383)

Jill felt that knowing the background and life experiences of her students would enable her to understand why her students behaved as they did in class. Yet without this knowledge, she felt that she would not be able to meet the personal and instructional needs of her students. Unknowingly, the lack of this knowledge resulted in Jill trying understand her students through her own lens of experience. For example, during one interview, Jill openly wondered why most of her students could not be more motivated like Michelle, a student who was living out of a car and still coming to class every day to learn (Observation 2/8).

The constrained feelings towards the group that Jill held at the beginning of the semester were gradually transformed into concerns about individuals as she began to know the life experiences of her students. One student told Jill about being "jumped" into a gang. This student was kidnapped and then beaten by the gang members as a rite of initiation. The student did not want to be in the gang, but could see no way out (Interview 2a, 1532-1551). Another student spoke to Jill about the importance of being committed to friendships. This student was so committed to the idea of friendship it was conceivable to fail a class in order to stay in the same grade with her friends (Interview 2b, 2073-2098).

With each additional story that was shared by a student, Jill gradually shifted her concern of "not knowing the students" from the larger group to smaller groups of students.

Jill experienced a marginalization of her students in science

Jill elected to teach at Center City Middle school because of the diversity of the students. She ultimately wanted to provide her students with opportunities to participate in science. Jill wanted her students to work with materials, create their own experiments, and have plenty of opportunities to develop their thinking skills (Interview 1a, 57-59). Yet providing this experience was not as easy as she expected. Throughout the semester Jill experienced a marginalization of her science students by both the students themselves and her colleagues. Students did not care to participate in science, and her colleagues concluded that the students needed social skills before they needed science.

Throughout the semester, Jill experienced the self marginalization of her students in two ways. First, students would come to class and elect not participate. For Jill, non-participation was either being present but not contributing, or engaging in alternative projects in class. For example, during one lesson Jill had the students form a human graph to represent their data. On the floor of the class, Jill drew an X and a Y coordinate and the students took their appropriate positions. As Jill asked her students simple and complex questions that required a processing of the data, several of the students stood quietly and did not participate. Jill followed this assignment with a written summary by the students, yet only a few turned it in (Observation 2/8). During another class, several students sat and drew pictures of cars instead of participating in an investigation about plants (Observation 4/4). Second, Jill felt her students marginalized themselves when they deferred to her as the authority. Instead of working together to discuss and reflect upon

science investigations in small groups, Jill's students would prefer to find her and verify their progress. Jill's experience with concept maps at the end of the semester demonstrates her on-going frustration with being the authority. Jill asked her students to create concept maps on the topic of ecology. Throughout the process of concept map creation, the students continually asked Jill if their concept maps were correct. Jill countered, repeatedly, "does the concept map represent your ideas about ecology?" The students would respond as if they had not heard her response "is the map correct? (Interview 4a, 4133-4155).

Jill felt that her colleagues ultimately wanted the Central City Middle School students to succeed in science, yet their course of action was different than her own. Jill's plan was to provide her students with countless opportunities to experience science, as opposed to the strong emphasis on basic skills suggested by her colleagues (Interview 1a, 34-44). She could understand that her colleagues felt that the students should learn basic skills in order to succeed in science, but she wanted the skill acquisition to be integrated with the science curriculum. Throughout the semester Jill planned science lessons that focused on student-directed inquiry and cooperative learning. Students had to ask their own questions, find their own answers, analyze their own findings, and share their own results while working in small groups. With each open-ended lesson that Jill taught, her colleagues reminded her that the students did not have the basic skills to carry out these investigations (Interview 1a, 810-836; Interview 2b, 1487-1504; Interview 4b, 3878-3887; Journal entry, p. 6). The students, she was often told, needed instruction that emphasized life skills and not open-ended activities. Jill often wondered if her colleagues beliefs about

the students' ability to perform was in fact a self fulfilling prophecy for her students (Observation 2/8, Interview 5b, 246-250).

Jill experienced a desire for her science instruction to be more relevant to her students

When Jill started her student teaching she envisioned creating an instructional format that pertained to all students. Her initial plan was to make her science instruction more relevant to her students by providing her students with several opportunities to "do" science and by providing her students with the opportunity to make choices within their own science experiences (e.g. students designing their own experiments) (Interview 1a, 34-59). Jill accomplished this early in her student teaching by modifying the lessons that she was directed to teach by her cooperating teacher. She restructured her lessons to increase the interaction of her students within the lesson, and she frequently removed extraneous directions that eliminated the opportunities for students to creatively solve problems (Interview 1a, 1132-114).

Towards the end of her student teaching, Jill continued to espouse her desire to provide her students with relevant science experiences, but she had also added a new dimension to her advocacy. Jill wanted the science experiences that she presented to be connected directly to her students' lives. She wanted her students to have science experiences that were rich, genuine, and meaningful, while providing an opportunity to learn about the nature of science (Interview 4a, 4554-4559). Jill did this by providing her students with investigations designed to create a high degree of interaction among the students and herself, and she included more opportunities for her students to contribute their own cultural knowledge. For example, during a lesson on bears, students shared the

stories they knew about bears, and during the building of plastic biomes her students brought in local plants that they were familiar with (Observation 5/1; Observation 4/18). Jill's desire to make her instruction more relevant ultimately resulted in her consciously connecting and including her students' cultural knowledge.

Discussion and Implications

This study examined the student teaching experience of Jill, a multicultural science education enthusiast. It specifically depicts Jill's personal experiences as she undertook her student teaching in a culture different than her own. Her story illustrates the complexity of learning to teach in diverse settings, and it offers suggestions for preservice students who engage in cross cultural experiences and preservice programs that advocate a multicultural focus.

Jill

As a student teacher, Jill held strong beliefs about the teaching of science. Her beliefs of science through inquiry and equitable practice for all students were salient throughout her student teaching experience. These beliefs continually guided Jill as she negotiated her way through her student teaching journey. For Jill, her beliefs knowingly and unknowingly provided her with the capacity to resolve (in varying degrees) the dilemmas she experienced throughout her student teaching. For example, as Jill perceived her students as being marginalized, she responded by providing her students with inquiry science lessons in which they could acquire the skills her colleagues emphasized.

Jill's beliefs were clearly not forged within one semester. Instead, her beliefs began with her own interest in anthropology and were continually refined throughout her preservice program. Prior to her student teaching, Jill had several opportunities to expand

her multicultural ideology and construct her own meaning of multicultural science education. She completed field experiences in schools whose cultures were different from her own and she participated in the multicultural curriculum in her preservice program. As a student teacher, Jill had the opportunity to attach her multicultural science education understanding to her own experience. Jill's preservice experience reinforces the importance and need for extended programs that focus on multiculturalism (see Noordhoff & Kleinfeld, 1993), versus the marginally effective short term options (Aaronsohn, Carter, & Howell, 1995; Baker, 1977; McDiarmid, 1990).

Jill's beliefs did guide her in providing more equitable instruction to her students, and furthermore her beliefs prevented her from compromising her own instruction. While Jill adhered to the instructional requirements of the school (e.g. science fair), she did not accept marginal science experiences for her students. Jill wanted her students to have quality science experiences. And in the face of opposition, from either her cooperating teacher or her students, she reinforced her beliefs with positive interactions with her students and her peers at student teaching seminar. Jill gathered the support she needed to in order to create the instructional climate she wanted to enact. Jill, like Marie in Abell and Roth's (1994) study, was an active agent in her own student teaching experience.

Implications

By examining Jill's experience at Central City Middle School, science educators can better prepare and assist the increasing number of preservice students who will be student teaching in cultural environments different than their own. From Jill's study, there are three implications that can be made.

First, science education programs should provide multiple field experiences in diverse cultures, and course work should be offered that supports working with different cultures. Ideally, course work and field experience would focus on the sharing of information about cultures and developing an understanding of different cultural perspectives. Preservice students should also be encouraged to understand their own cultural identity and the oppression of others (Bollin & Finkel, 1995).

Second, preservice science students need a good understanding of effective science instruction, this includes pedagogy, content, and the history and philosophy of science. Preservice science teachers should learn science in a manner that represents the field of science, and they should know and understand the tenets of effective science instruction. A understanding of science that complemented with history and philosophy would provide a preservice science student teacher with an additional arsenal of tools to increase the relevancy of science to the students.

Finally, preservice students who are student teaching in a culture different than their own, would certainly benefit from having a close "other" as a confidant and as a reflective partner (see Baird, Fensham, Gunstone, & White, 1991; Schön, 1983). Ultimately, an "other" would encourage the student teacher to understand the effectiveness of their own teaching practice and how they enact equitable instruction. Supervisors and student teaching peers will both need redefine their roles to become reflective partners, as opposed to solution givers.

Notes

1. Pseudonyms have been used throughout this paper.

2. It is acknowledged that their are several different forms of diversity (e.g. economic, ethnic, cultural, etc.). This study will focus on cultural diversity, and will refer to those populations that are typically underserved and underrepresented in science: Hispanic-Americans, African -Americans, and Native-Americans.

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